NOAA-DOE ***Combined Sensor Cruise*** on *NOAA Discoverer*

15 March - 13 April 1996, in Warm Pool area of TWP

Objectives:

- to exercise a prototype M-AERI in a harsh, extreme marine environment
- to make measurements of the SST in a fashion intended to be employed in MODIS Ocean validation
- to make measurements useful for validating current infrared satellite radiometers in the TWP areas (AVHRR, ATSR, GMS, GOES)
- to study near-surface SST gradients - spatial, skin, diurnal
- to study effects of clouds and atmospheric variability on surface heat budget

Sea-surface temperature measurements in the Tropical Western Pacific

A test of MODIS validation techniques.

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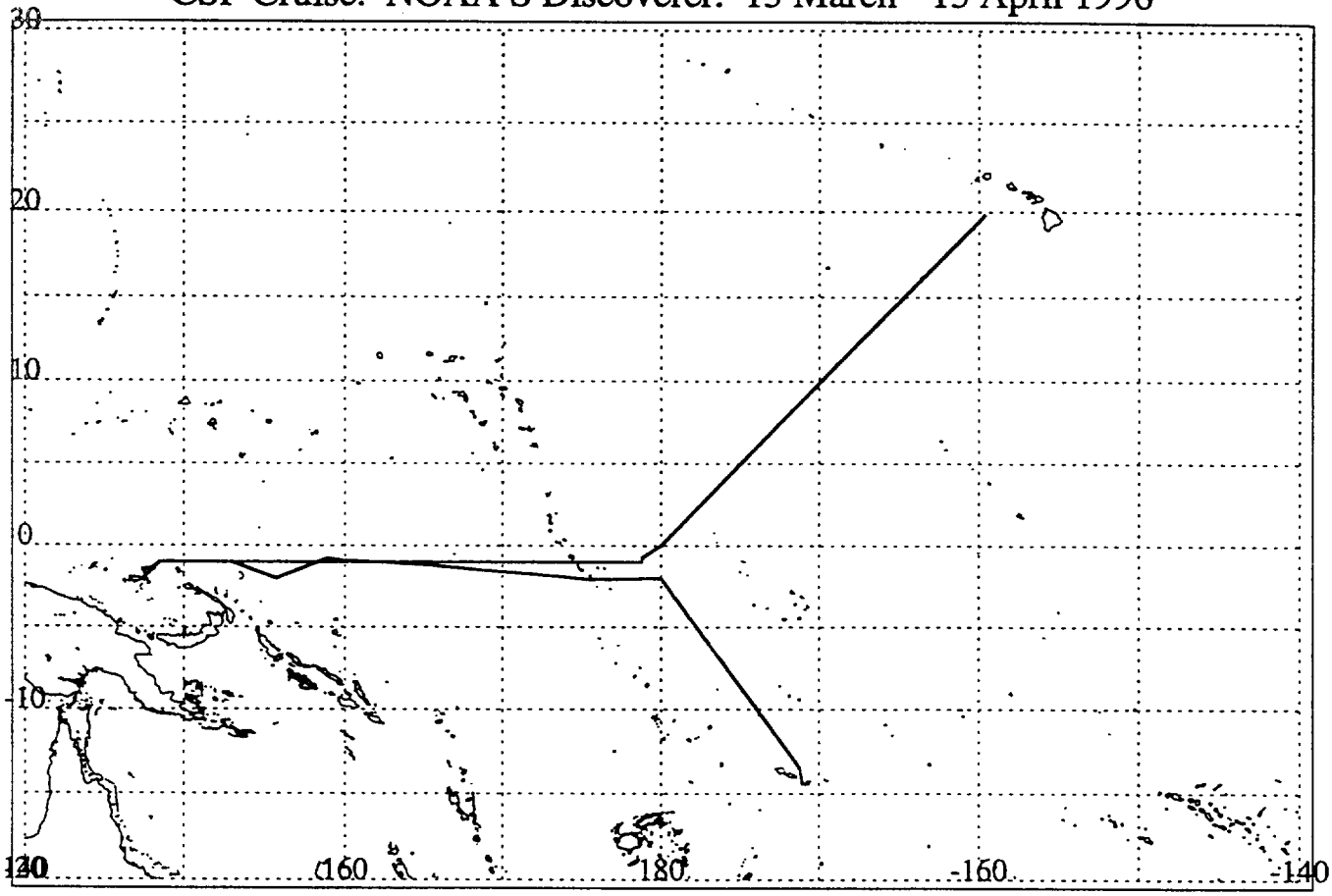
RSMAS, U. Miami

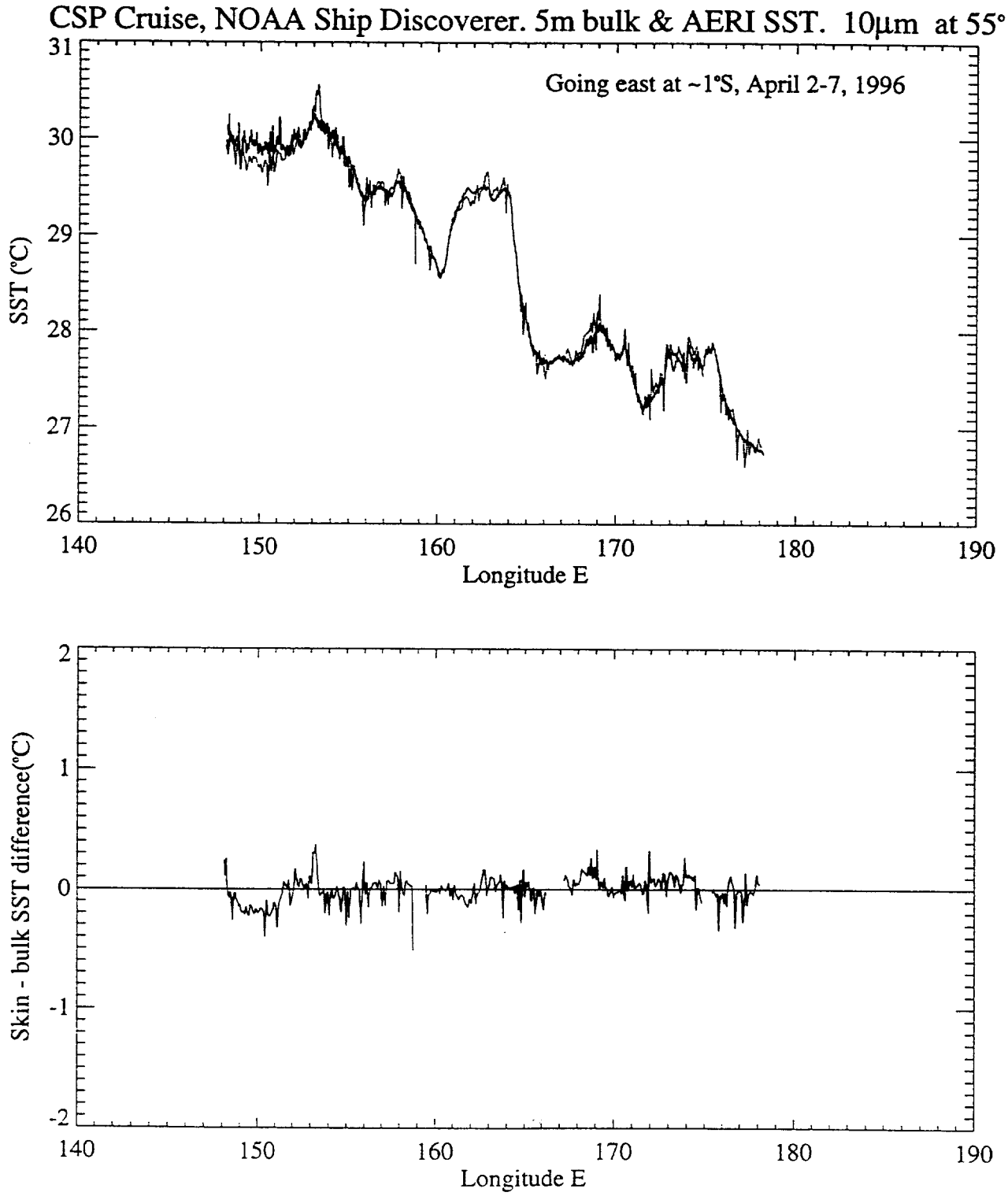
R.O. Knuteson, J. Short, N. Nalli & B.J. Osborne
SSEC, U. Wisconsin

CSP Cruise. NOAA S Discoverer. 15 March - 13 April 1996



Instruments deployed:

- M-AERI prototype (U. Wisconsin)
- SOB (U.Wisconsin)
- all-sky video system (U. Miami)
- 9.6-11.5 μm IR thermometers (U. Miami)
- surface float for 0.1m depth bulk SST (U. Miami)
- 5m depth bulk SST (Discoverer)
- radiosondes (U. Miami, NOAA ETL)
- eddy correlation turbulent fluxes (NOAA ETL)
- broad-band surface radiometers (NOAA ETL, PMEL)
- cloud radars (NOAA ETL, U. Mass)
- Raman lidars (LANL)
- μwave radiometer (NOAA ETL)
- zenith viewing ir FTIR (NOAA ETL)
- aerosol properties (NOAA PMEL)
- rain rate (NASA GSFC, U. Colo)
- sun photometer (Penn State)
- Surface radiation package (BNL)


CSP Cruise, NOAA Ship Discoverer. 5m bulk & AERI SST. 10μm at 55°
Going east at ~1°S, April 2-7, 1996
SST (°C)
31
30
29
28
27
26
140
150
160
170
180
190
Longitude E
Skin - bulk SST difference(°C)
2
1
0
-1
-2
140
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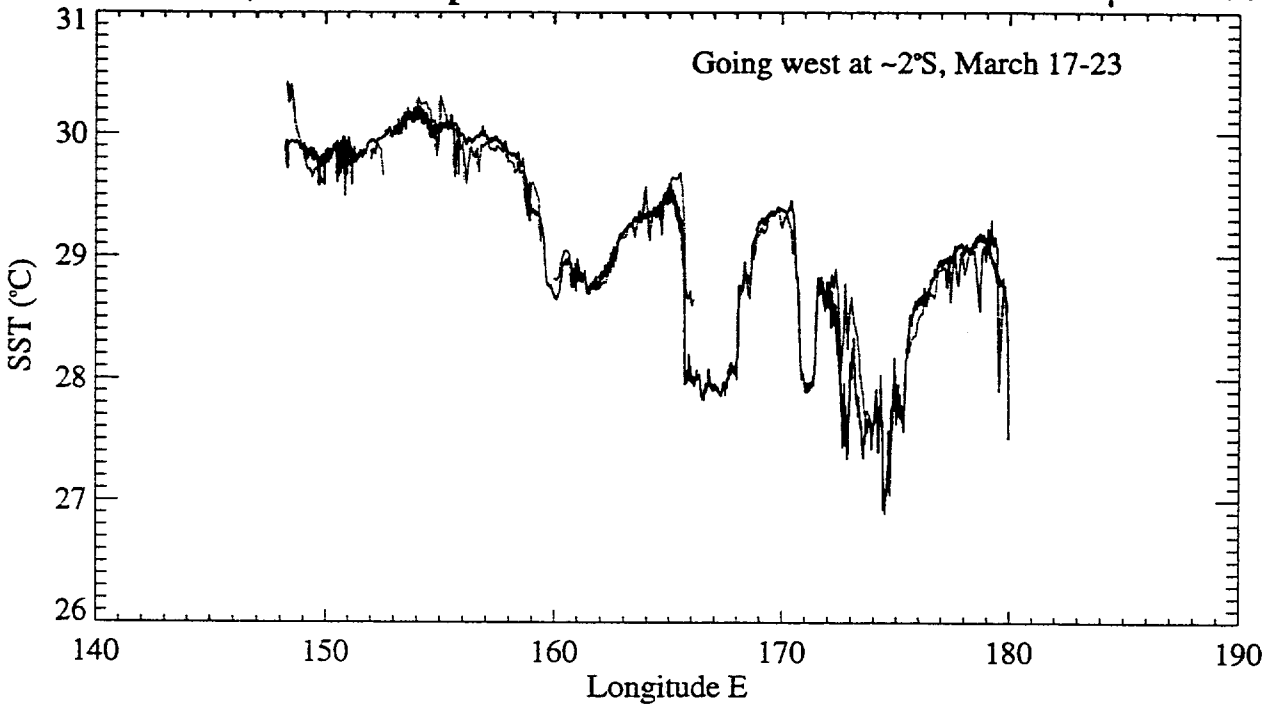
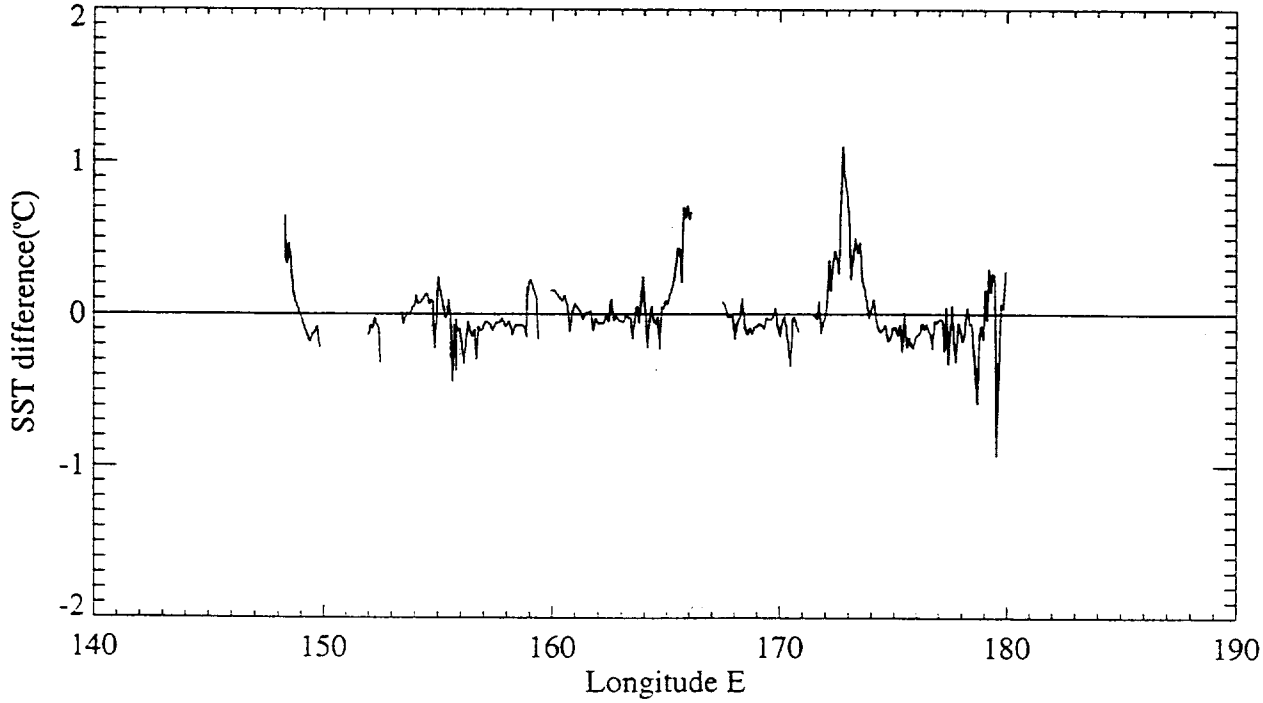
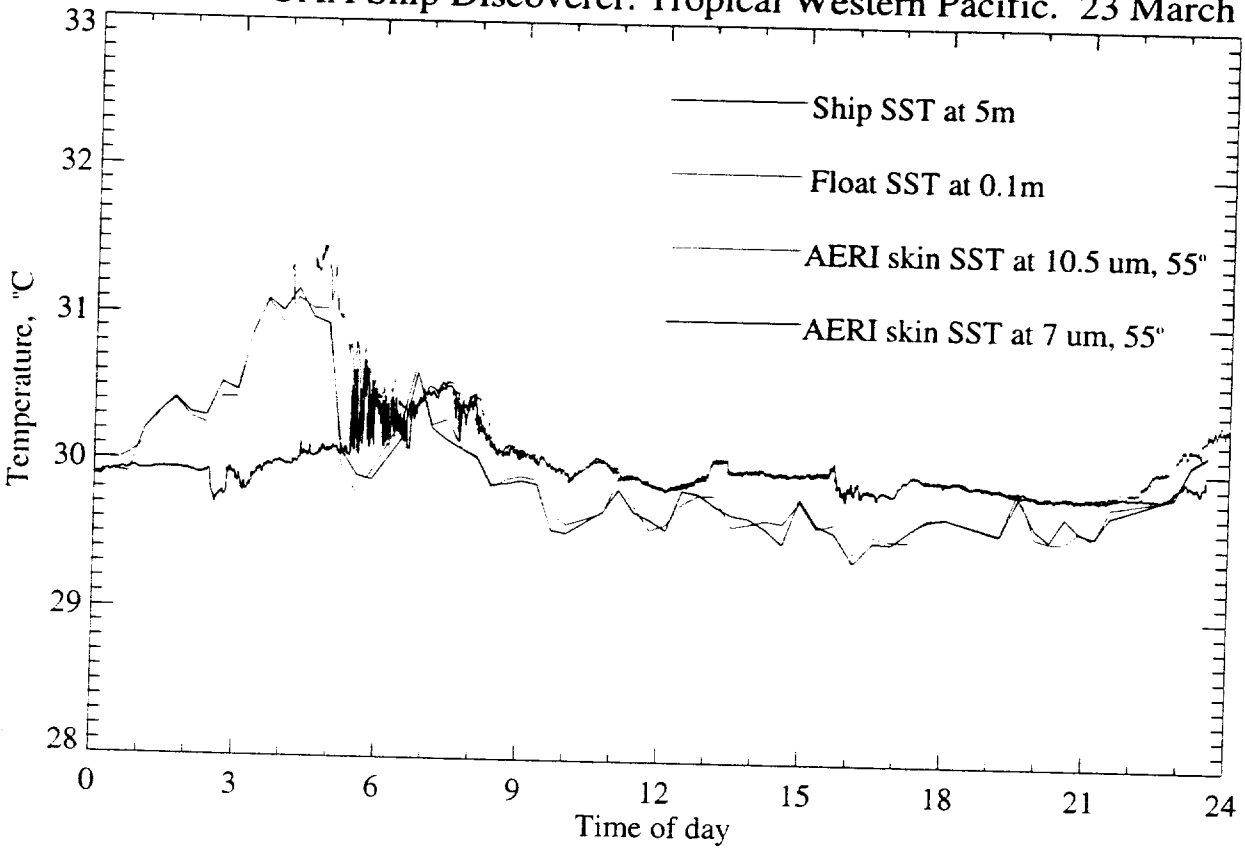
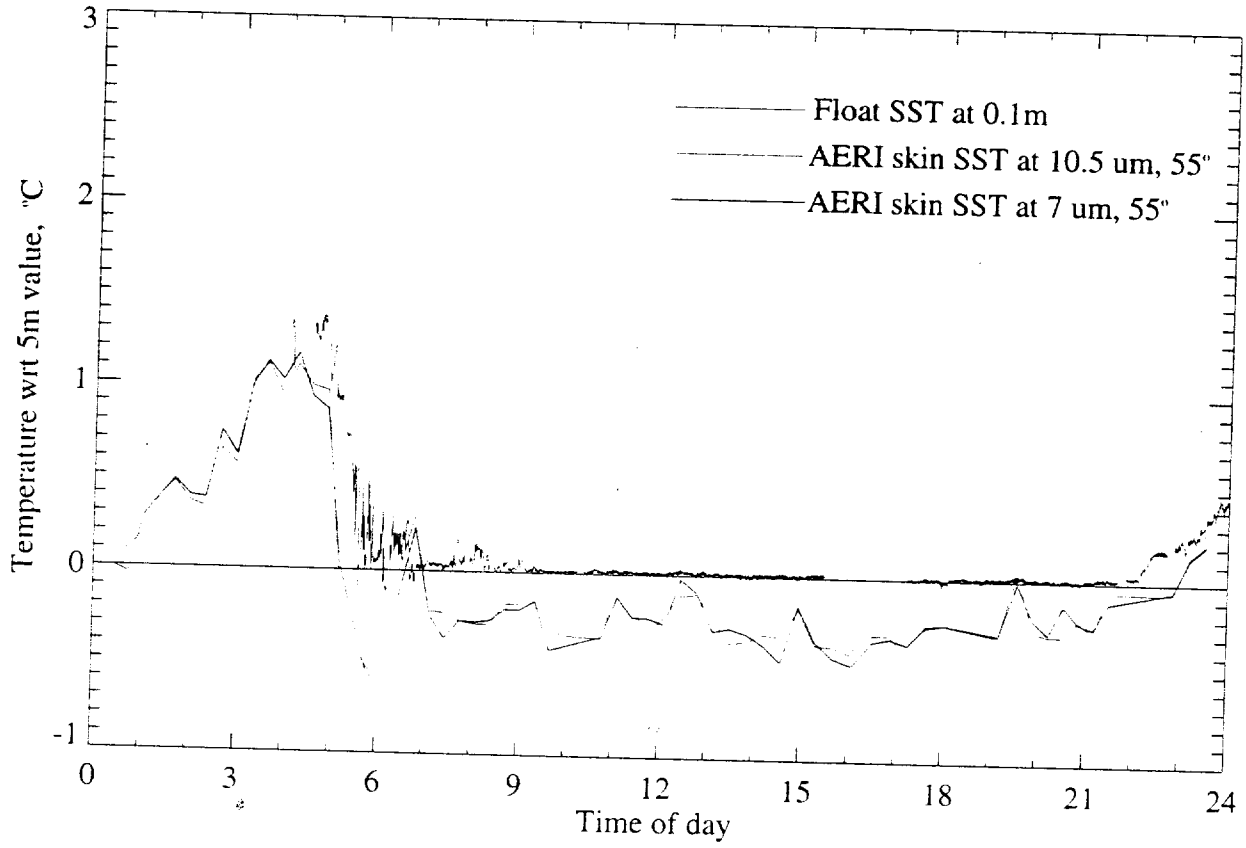


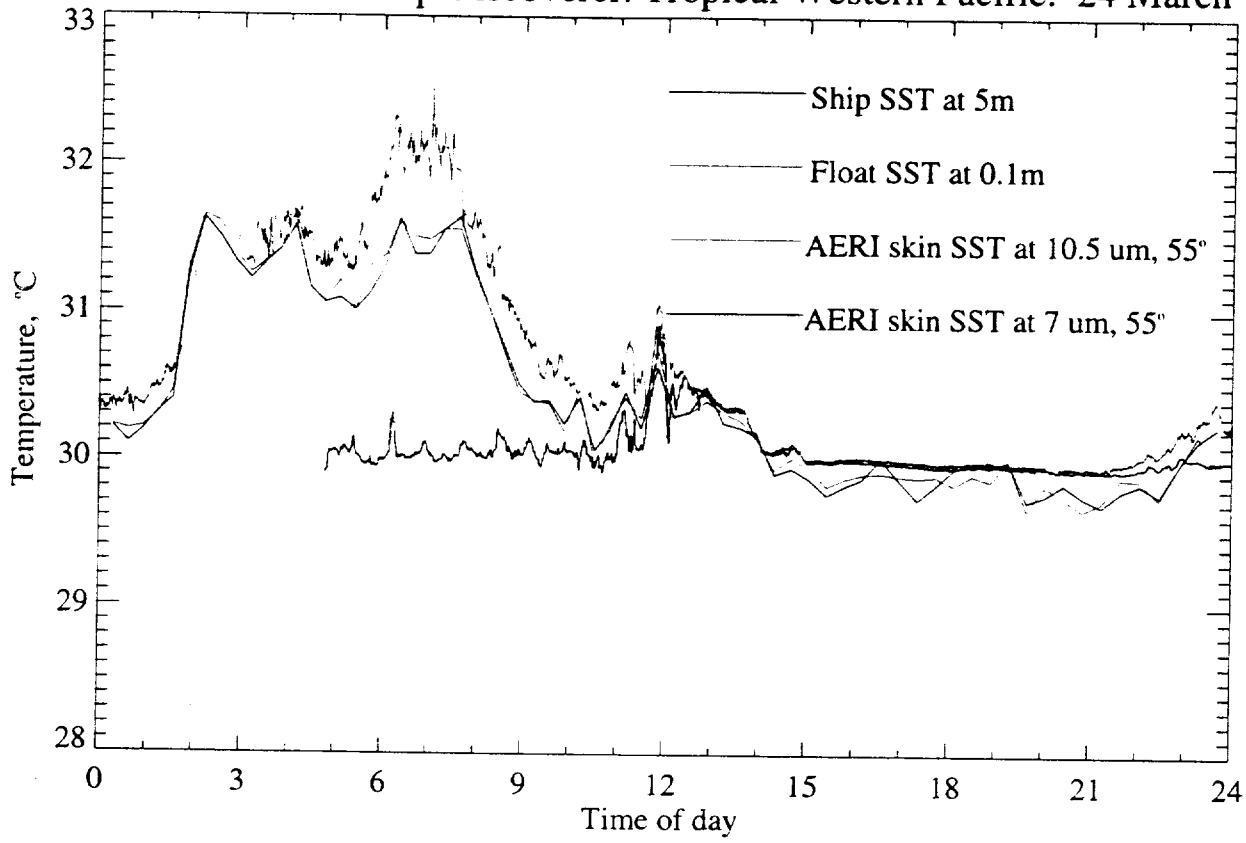


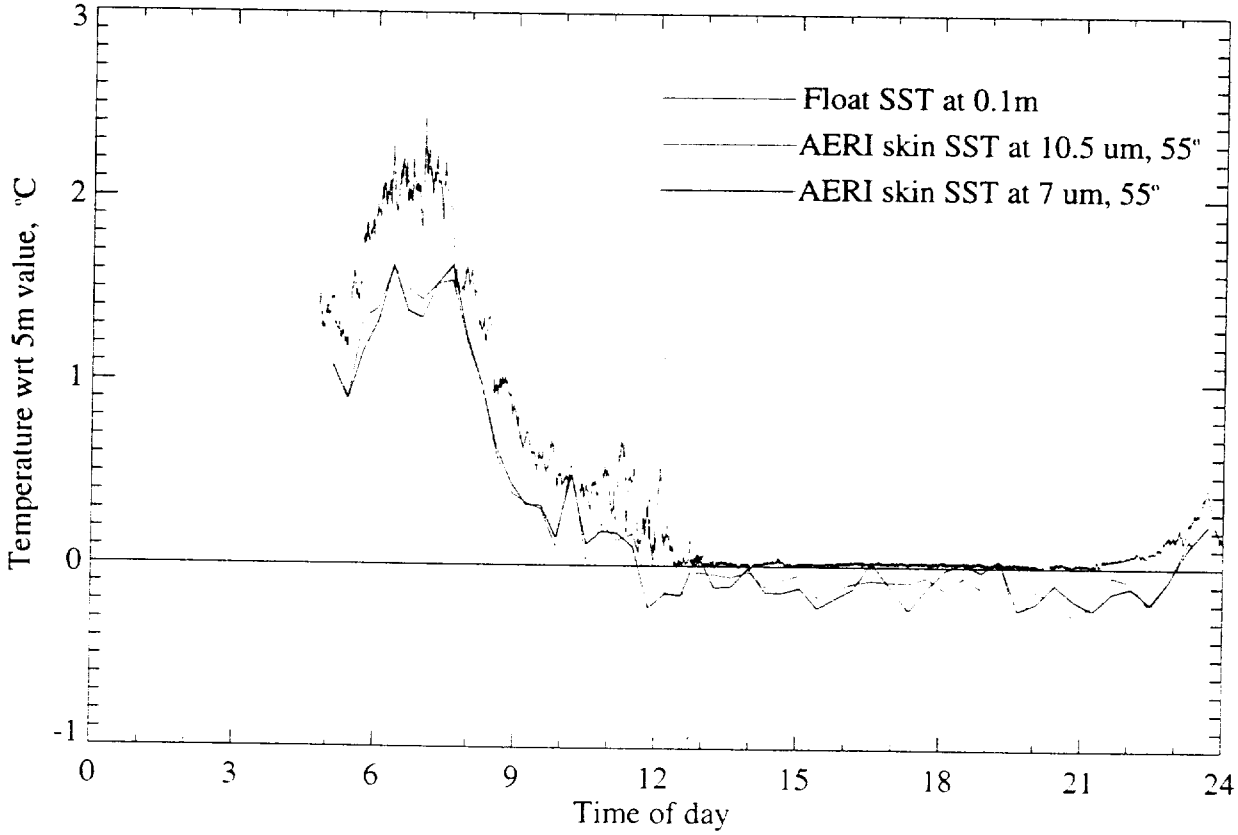
CSP Cruise. NOAA Ship Discoverer. Tropical Western Pacific. 23 March 1996



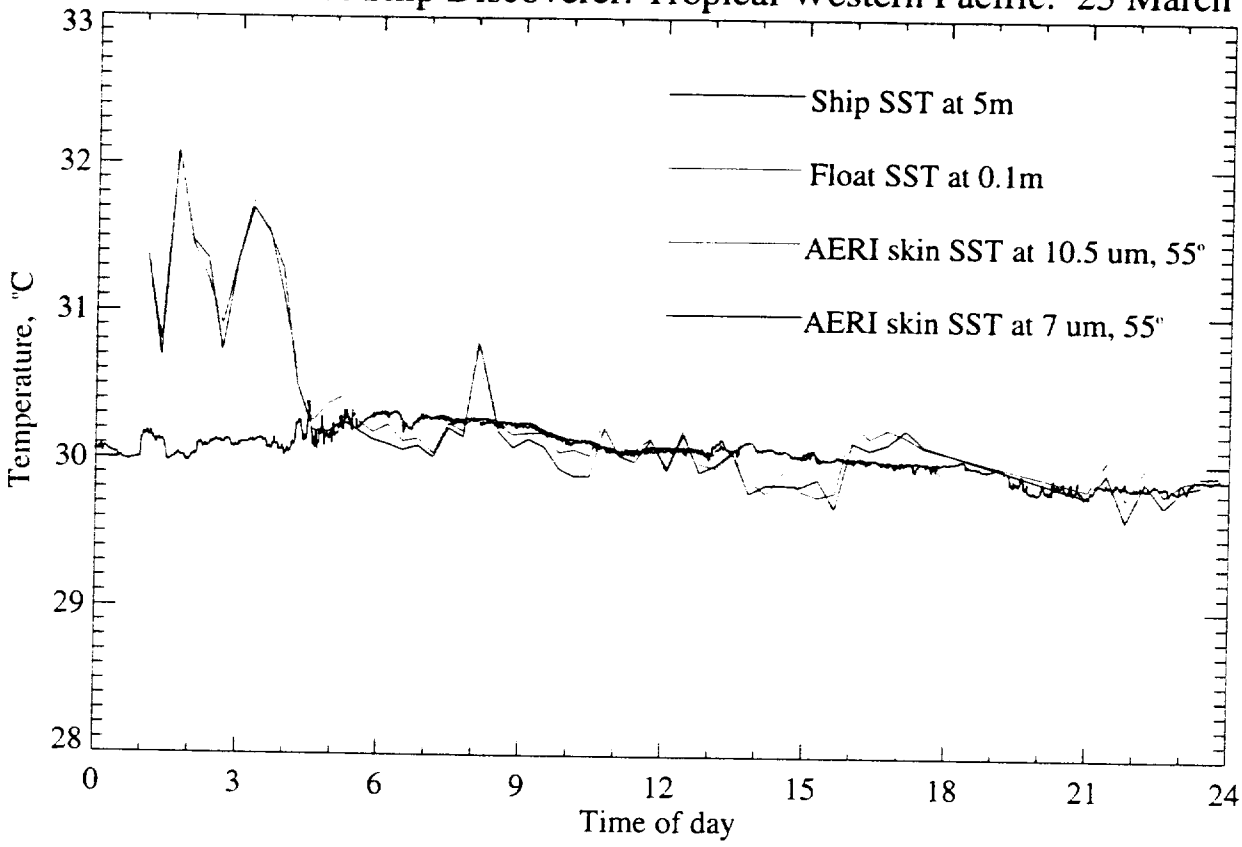


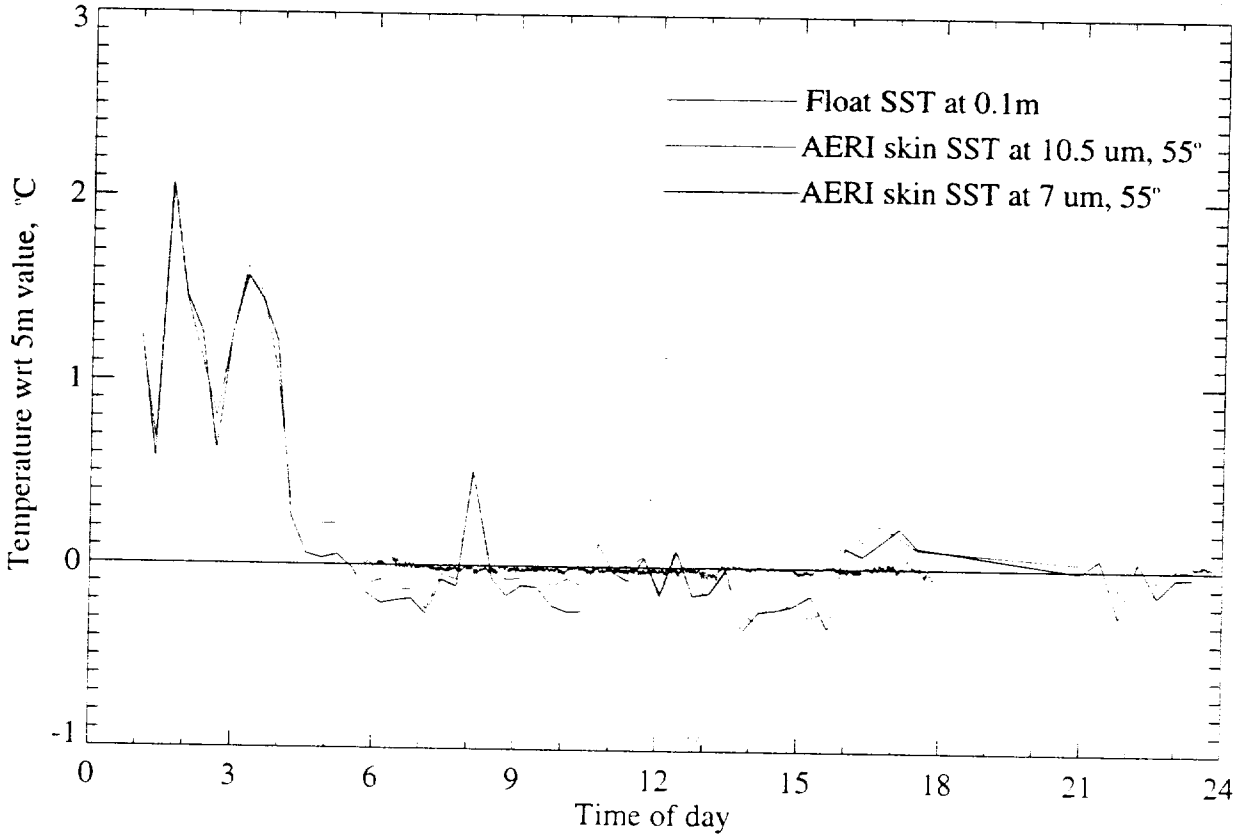
CSP Cruise. NOAA Ship Discoverer. Tropical Western Pacific. 24 March 1996

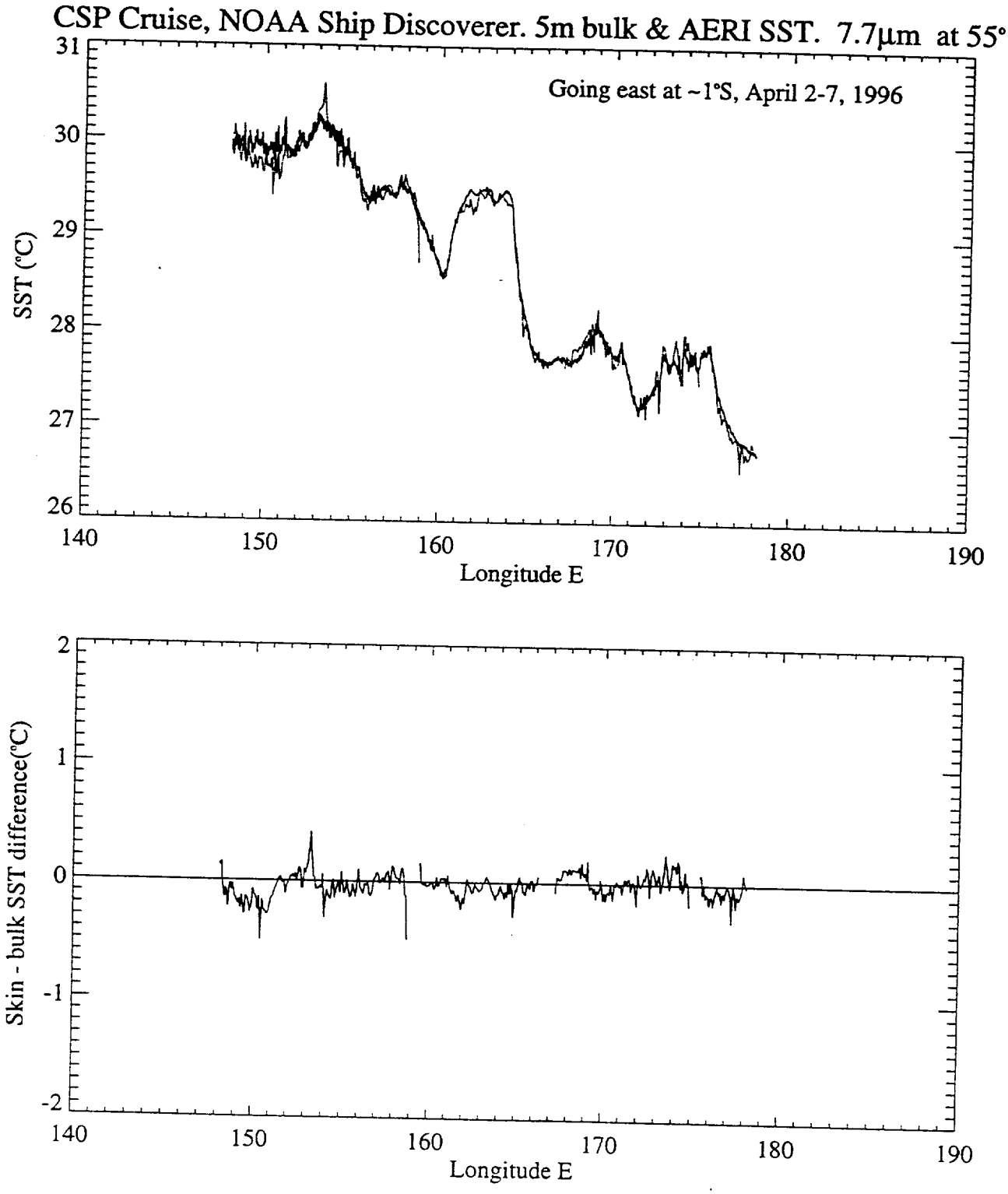




CSP Cruise. NOAA Ship Discoverer. Tropical Western Pacific. 25 March 1996



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Preliminary results:

1) The AERI functioned well in the harsh environment, and produced good spectra despite high ambient and internal temperatures

2) Comparison between selected calibrated AERI zenith spectra and those measured by a similar FTIR of the NOAA ETL were visually identical. This indicates that the absolute calibration on both instruments is correct.

3) The AERI and ancillary *in situ* thermometers showed excellent consistency and implied accuracy. The AERI skin temperatures were consistently a few tenths of a degree cooler than the *in situ* measurement at 0.1m (i.e. the skin temperature was cooler than the bulk temperature just below the surface) and on days of low wind speed, diurnal thermoclines with surface amplitudes of over 2° were measured.

4) Atmospheric humidity was variable, mainly showing longitudinal variation. Several of the other instruments on the cruise (microwave radiometer, lidar, radiosondes) will be useful in characterizing the water vapor distribution and aid in the analysis of the AERI spectra.